

FACTORS AFFECTING THE RATE OF CHEMICAL REACTIONS

The rate of reaction is defined as the speed at which a reaction occurs.

The rate of reaction is determined by:

a) **Temperature**

- Increase in temperature increases rate of reaction

KMT Explanation

- Temperature increases the average speed of molecules increases --> molecules move faster --> encounter and collide with more molecules
- Molecules may hit each other hard enough for chemical bonds to break and new molecules to form
- Increase in temperature makes molecules collide **more often** and **more effectively**

e.g. High temperatures reduce the amount of time it takes to cook food

b) **Concentration**

- A concentrated solution is a solution that has a large amount of solute compared to solvent
- A dilute solution is a solution that has a small amount of solute compared to solvent
- Increasing the concentration of the reactants may increase the speed of a chemical reaction.

KMT Explanation

- Increasing the concentration of reactants increases the number of collisions between molecules
- More molecules in a given space more likely to collide with each other

e.g. Concentrated hydrochloric acid reacts more vigorously with metals than dilute hydrochloric acid.

c) Surface Area (SA)

- Is the amount of area of a sample of matter that is visible and able to react

KMT Explanation

- increasing SA of a solid by dividing into smaller particles exposes more molecules to react --> reaction speeds up

e.g. easier to start a fire with small pieces of wood rather than a single large piece

d) Use of Catalysts

- Is a substance which speeds up a reaction and can be recovered unchanged when the reaction is complete
- Is not a reactant

KMT Explanation

- Catalysts work by lowering the initial (activation) energy required to start a reaction
- Less energy to get molecules over the energy barrier, more molecules will be able to cross over the barrier in a given time --> reaction rate increase

e.g. Amylase, an enzyme in saliva is a biological catalyst that speeds up the breakdown of starch, into glucose